

# THE THIRD WORLD WAR:



## *A LOOK AT THE IMPLICATIONS OF CLIMATE CHANGE ON GLOBAL, NATIONAL SECURITY*

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Apparently, climate change is a hoax, that is of course unless you have a golf course that needs protected from rising sea levels. President Donald Trump ran to be president of the United States on a platform rife with statements denouncing the credibility of anthropogenic — man-made — climate change. In a separate, but equally important, vein, President Trump also expressed a commitment to ensure the security of US citizens both domestically and abroad. Today, however, it's difficult to address national security effectively without simultaneously addressing global climate change. The two issues are intimately interwoven, and ignoring one issue will compromise the success of solving the other. For years, scientists and policy-makers have debated the legitimacy of climate change and what to do about it. Most scientists have found that evidence

most convincingly supports anthropogenic climate change, but fewer policy makers have accepted the science as readily.

In approaching solutions to climate change, it is essential to recall that policy affects all of us at varying degrees — some will even argue that it is possible to avoid the effects of some policies altogether. However, the health of the planet affects all of us directly. If we accept that climate change is initiated by human activity, then it is possible to study the many ways our climate will affect systemic frameworks of other policy areas. Specifically, acceptance of climate change will enable us to identify the areas that will be most affected by climate change in addition to other aggravators that contribute to the problem. Today's morphing climate will cause shifts in weather patterns that will contribute to drought and a rise in

sea level, for example. Both realities of climate change will affect human populations by forcing individuals to move away from formerly habitable areas. Migration tensions and resource scarcity are known to create civil unrest. Under such conditions, we can expect that the stress placed on communities to fulfill resource needs will compromise national security as competition increases.

### **Historical Background**

The climate change debate is relatively new. The world's first oil discoveries appeared in the early-to-mid nineteenth century. These discoveries and others helped to fuel the growth of high-polluting industries through the 1860s. Not too long after, Svante Arrhenius, a Swedish scientist, claimed that fossil fuel combustion could eventually lead to an enhanced warming

in global temperature.<sup>1</sup> Arrhenius, in conjunction with American geologist Thomas Chamberlin, calculated that humans could raise the temperature of the Earth by adding carbon dioxide to the atmosphere through the burning of fossil fuels.<sup>2</sup> However, this theory went unconsidered by the mainstream for nearly a century until the experiments of Gilbert Plass, a Canadian physicist, in the 1950s. Plass measured infrared radiation, carbon dioxide concentrations, and the absorption of infrared radiation by carbon dioxide and water vapor. Concluding in 1955 that carbon dioxide intercepts infrared radiation, which would otherwise be transferred to space. Failure to transfer this radiation to space allows excess radiation to warm Earth's atmosphere.<sup>3</sup>

While Plass published his findings, an American scientist, Charles Keeling, began to measure levels of carbon dioxide concentrations in the atmosphere.<sup>4</sup> Keeling found that carbon dioxide concentrations undergo daily cycles reflecting the influences of photosynthesis, respiration, and atmosphere mixing.<sup>5</sup>

In 1958, with the support of Harry Wexler of the US Weather Service and Roger Revelle of the Scripps Institution of Oceanography, Keeling embarked on a project to survey the atmospheric concentration of carbon dioxide on a global scale.<sup>6</sup> Keeling hypothesized that Svante Arrhenius' suspicions about carbon dioxide and warming temperatures could be supported with

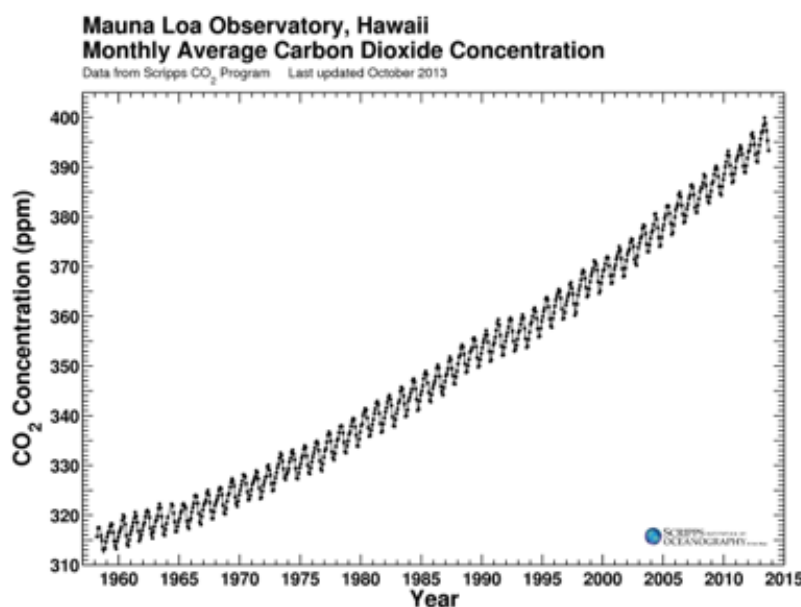
substantial data collection. Global concentrations were measured using mass spectrometry technology at the Mauna Loa Observatory and other land stations around the globe.<sup>7</sup> Within a few years, Keeling and his team collected enough data to show that atmospheric carbon dioxide was increasing. The record of these concentrations is now known as the "Keeling Curve" and it shows that global levels of carbon dioxide vary seasonally; carbon dioxide levels drop during spring and summer months for photosynthetic activities and levels rise in the winter after most vegetation dies off. Though more importantly for today's climate debates, the Keeling Curve effectively shows that atmospheric carbon diox-

tions and shows that the global average of carbon dioxide concentrations has increased over the past six decades.<sup>9</sup>

### Scientific Evidence

While it is reasonably likely that the planet will experience irreversible changes because of climate change, climate scientists do not yet know to what extent these changes will occur. The Intergovernmental Panel on Climate Change, or IPCC, has published five assessment reports regarding the effects of climate change. The most recent report published in 2015 offers four possible climate projections. These projections are known as Representative Concentration Pathways (RCPs), and the IPCC has listed

the projections as RCP 2.6, RCP 4.5, RCP 6.0, and RCP 8.5.<sup>10</sup> The RCP 2.6 projection represents aggressive efforts to curb greenhouse gas emissions so that they are dramatically reduced from current levels by the year 2100, while RCP 8.5 follows a "business as usual" path and allows greenhouse gases to rise into the year 2100.<sup>11</sup> The other two projections fall somewhere in between these two extremes. RCP 8.5 uses strong mitigation standards to predict that the average global tempera-



ide concentrations have consistently increased from 315 parts per million (ppm) in 1958 to over 400 ppm present day.<sup>8</sup>

Figure 1: The "Keeling Curve" is a measure of global carbon dioxide concentrations from the year 1958 to present. The curve shows seasonal changes in carbon dioxide concentra-

ture will rise 0.2-1.8 degrees Celsius by the year 2100.<sup>12</sup> If world governments implement moderate mitigation efforts, RCP 4.5 and 6.0, temperature may rise 1.1-3.1 degrees Celsius.<sup>13</sup> If no efforts are made to curb greenhouse gas emissions, scientists expect an average warming of 2.5 to 4.6 degrees Celsius.<sup>14</sup> However, it is important to recognize that the climate will change

even though the degree of severity is unknown due to the models' dependence on the cooperation and environmental efforts of states.

Part of the difficulty in assessing the future impacts of climate change — and in convincing the public of the risks of climate change — is the accuracy of climate models. To assess the risk that climate change poses to the planet, it is first useful to analyze the past IPCC projects to see how they compare to actual data. If the predicted projections and actual data align, there is good reason to believe that the IPCC projections will continue to be accurate for future years as well. The IPCC began making assessments in 1990, and these projections have aligned with actual data for the last 25 years for atmospheric carbon dioxide, average global temperature, mean sea level rise, and sea ice extent.<sup>15</sup> In its summary for policy makers, the IPCC notes that it is “very likely” that the number of cold days and nights has decreased and the number of warm days and nights has increased on a global scale” since 1950.<sup>16</sup> Some dissenters argue that recent years have been cooler than the initial IPCC projection and thus provide evidence against the warming planet theory. However, this perceived cooling is a temporary effect of random natural climate factors like regular El Nino cycles, volcanic eruptions, and other unpredictable natural factors,<sup>17</sup> and such an argument ignores the abundant data that supports the claim that colder days have become less common over the past half-century.

Beyond simply warming the planet, climate change presents a host of complex issues for the planet. Climate change has the power to

affect many ecological processes, but the most obvious changes appear in the form of melting sea ice, sea level rise, changes in oceanic thermohaline circulation, and alterations of broad climate patterns. Let's begin by looking at the how oceans are affected by a warming planet. The oceans store more than 90 percent of the heat that is associated with greenhouse gas global warming,<sup>18</sup> but the IPCC also notes specifically that the upper 700 meters of the ocean stores 60 percent of the

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net energy increase in the climate system.<sup>19</sup> This data was collected over a forty-year period from 1971 to 2010.

Warming of the air and oceans, especially in the upper portions of the oceans, directly limits oceanic ice extent. Sea ice plays a critical role in regulating the Earth's climate system. Ice covers on the surface of the ocean serve to insulate the ocean by preventing heat loss and regulating the momentum of gas exchanges between the atmosphere and the ocean. Moreover, the growth and shrinking of sea ice creates variations in “salt ejections” otherwise known as local salinity. Changes in local salinity alters the density structure of the waters and thereby modify regional circulation. These regional effects feed into global systems and can alter climate on a broader scale through looping mechanisms.<sup>20</sup> Satellite images from the Goddard Institute

show that average Arctic sea ice extent has decreased each year since the records began in 1979.<sup>21</sup> Specifically, the IPCC reports with high confidence that since 1979, this sea ice has melted at a rate that decreases ice extent by 3.5 to 4.1 percent per decade.<sup>22</sup> It is likely that these trends will continue to amplify through feedback mechanisms. To elaborate, ice and snow are surfaces that have a high albedo — a measure of reflectivity. Materials with high albedo are highly reflective and so reflect energy back into the atmosphere and space. Albedo variances play a critical role in regulating the energy and thereby warming within the earth system. With less sea ice, the Earth's overall albedo is lowered which allows for greater planetary warming; additional warming can melt more ice, and the feedback relationship is amplified.

In addition to the effects that a warmer environment has on sea level, many scientists also believe that higher average global temperatures contribute to the alteration of standard weather patterns. This may mean that extreme weather events like tropical storms, extreme drought, and heavy rains may become more frequent as the climate is thrown into a series of temperature fluctuations. Diverse changes such as these are the result of the complex patterns of shifting rain belts, more vigorous cycling of water in a warmer atmosphere, and increasing evaporation from the Earth's surface.<sup>23</sup> Moreover, rising temperatures and shifts in climate patterns will significantly affect the world freshwater supply. Increased temperatures not only mean increased rates of evaporation, but also subject freshwater bodies to algal blooms which contaminate human



drinking water.<sup>24</sup> The algal blooms can be corrected, but not without proper regulation and extensive economic involvement. Of course, all of these effects are only primary — not systemic — responses to climate change.

### Systemic Responses to Climate Change

While scientists feel that the immediate effects of climate change — warming, changing climate patterns, and sea level rise — are sufficient to raise concern for our planet's health and our personal safety, the rest of the population is not wholly convinced. However, the secondary and tertiary effects of climate change should worry global leaders and citizens. Recall that climate change likely will cause the planet to warm, which even on its own leads to several ecological responses. Firstly, higher sea levels resulting from a warmer planet lead to more flooded coastlines. Presently, the IPCC estimates that coastal areas could be affected by sea levels that rise anywhere from one to 10 meters; the amount of regional rise depends on geographical location as it is difficult to calculate average global rise.<sup>25</sup> This is a major issue for many people because 10 percent of the world population lives in coastal and low-lying regions where the elevation is within 10 meters of sea level; in some regions, like Bangladesh, upwards of 50 percent of the population live along the coast.<sup>26</sup> Secondly, warming of the planet leading to disruptions in normal climate profiles and weather patterns will have several implications. Specifically, the IPCC notes that hot and dry regions of the world will become hotter and drier, while rainy regions will likely experience increases in severe storms.<sup>27</sup> Overall, moving toward these extremes will make it more difficult to secure freshwater

supplies for human consumption and agricultural practices. Without substantial water supplies, significant portions of the population will suffer from drought and food shortages.

#### *Sea Level Rise in Bangladesh*

As early as 2009, scientists at Columbia University expressed concerns that by the middle of the twenty-first century, people may be fleeing coastal areas and river banks due to increases in flooding frequency.<sup>28</sup> In a report that year, Columbia researchers used data from extreme weather events that severely damaged Bangladesh in 2007. A tropical storm devastated the nation, causing 3,363 flood-related deaths and displacing an additional 10 million people.<sup>29</sup> Crop yields for that year also dropped by 13 percent due to unfavorable weather. Bangladesh is unique in its vulnerability to flooding — the nation contains seven major rivers and over 200 minor rivers.<sup>30</sup> Because of this geography, Bangladesh is expected to be most affected by rising sea levels by 2050 despite its having contributed very little of greenhouse emissions that have led to today's climate change problem and sea level rise.<sup>31</sup> It is expected that these rising seas will inundate nearly 17 percent of the land and will displace approximately 18 million people.<sup>32</sup>

To deal with the imminent deluge, the Bangladeshi government is raising levees, dredging canals, and pumping water to reduce the frequency of flooding in the lowest lying areas.<sup>33</sup> Unfortunately, such practices today will only cause more harm in the long term.<sup>34</sup> Unfortunately, without help from other nations or international bodies, Bangladesh has few options. It is a nation stricken with poverty and lack of adequate infrastructure. Many of the nation's leaders do not believe that the rising sea levels

are a problem, but residents like Jah-anara Khatun whose bamboo shack sits below sea level live with the problem daily. Khatun and many others struggle to maintain their subsistence farms because sea level is already encroaching and poisoning the water tables and crop fields.<sup>35</sup> Without the monetary means to migrate or get a new job, many individuals are trapped. One Bangladeshi man who was forced to leave his hometown commented on the condition of the new slum in which he is living, "All of us came here because of erosions and cyclones. Not one of us actually wants to live here."<sup>36</sup>

#### *Drought and Agriculture in Syria*

Changes in precipitation have clear effects on the water supply of a region. Syria serves as an excellent example. For the last two years, Syrians have fled to Turkey and Greece to escape ensuing violence and a lack of work at home. However, the Syrian conflict is not due only to poor governance and civil unrest; it has origins rooted in fundamental human needs. Political theorists argue that the unrest in Syria can largely be attributed to the nation's agricultural practices. In the 1970s, President Hafez al-Assad announced that Syria would strive for agricultural self-sufficiency,<sup>37</sup> far before climate change had become the hot button issue it is today. Although Syria has always been a relatively dry region, farmers had historically been able to drill wells to water their fields. Thus, no one doubted Syria's ability to irrigate more farmland. Over time, however, water tables dropped, and in 2005, the regime under President Bashar al-Assad made it illegal to dig new wells without a personally issued license from an official.<sup>38</sup> Without means to drill new wells and as the drought increased due to a warming climate, fields became drier and farmers could no longer turn

a successful harvest. The water crisis had pushed frustrations to the limit. The luckiest farmers could stretch their resources for roughly three years, but after that, “they had no ability to do anything other than leave their lands” says Richard Seager, Columbia University professor and co-author on the *Proceedings of the National Academy of Sciences USA*.<sup>39</sup> Finally in 2011, Syrian farmers and others affected by the water crisis were fed up. The Arab Spring bathed the Middle East and violence ensued.<sup>40</sup>

#### The United States’ Interests

It is undoubtable that climate change has immediate impacts on human lives and international systems. The United States Military, in its most recent Quadrennial Defense Review, states that rising sea levels, escalating temperatures, and increasing numbers of severe weather patterns in combination with “other global dynamics, including growing, urbanizing, more affluent populations, and substantial economic growth” in up-and-coming nations like India, China, and Brazil, will devastate infrastructure, lands, and homes.<sup>41</sup> The review further stresses that damages to infrastructure, especially in developing nations, can compromise the stability of these developing nations. Poor infrastructure and damaged lands directly impact a nation’s food and water supply; scarcity of these resources leads to increased competition which place additional burdens on economies, societies, and

governments<sup>42</sup> as shown above in both Bangladesh and Syria.

The United States Department of Defense tasked the University of Maryland with researching climate change policies and the effect that climate change has on societies and national security.<sup>43</sup> University of Maryland professor Elisabeth Gilmore, headed research that forecast civil conflict under different climate change scenarios. Her research concluded that “there are a number of plausible causal mechanisms...such as population exposure and human health, economic growth, [and] institutional capacity and governance” that could enhance the likelihood of conflict in areas affected by climate change.<sup>44</sup> The concern with

has and will continue to have serious implications on our borders and international systems. The stresses that climate refugees create for nations is a serious matter of national security.

Why then, have governments, particularly the American government, been so ineffective at addressing the issue? Given the series of events that has transpired in the Middle East within the last ten years, it is difficult to not draw conclusions between climate change and potential national security implications. Recall that part of Syria’s trouble with conflict stems from the citizens’ inability to continue their livelihoods, namely subsistence farming. In their paper “Global Warming and the Arab Spring” Sarah Johnstone

and Jeffrey Mazo claim that there is good reason to link the Arab uprisings to food-price inflation.<sup>46</sup> The Arab Spring gained significant momentum in 2011.

Secondary Effects of Climate Change		
Physical Consequence of Climate Change	Social Consequence	Example
Sea Level Rise	Water contamination Migration out of flooded areas	Flooding in Bangladesh affects the most underserved populations. Government spending to keep floodwaters out is only putting a bandage on a wound that needs stitches and continuous medical attention.
Changing Climate Patterns lead to Drought	Agricultural Production Declines	Many farmers in Syria have given up their way of life because farming is no longer a sufficient career under drought conditions.

climate change and national security is not that climate change has a direct impact on safety within nations, but the primary effects of climate change — drought, increased severity of natural disasters, and so forth — have great potential to place stress on social and economic institutions.<sup>45</sup> Stress on such systems are amplified in developing nations because they do not have advanced coping mechanisms to deal with the change that climate change will bring about. Moreover, the migration of millions of individuals seeking to escape the effects of climate change

This same year, food prices surged in response to poor weather around the globe in 2010. China experienced record rainfall which cut the country’s harvest by roughly 25 percent while drought plagued Russia, Ukraine, and Kazakhstan.<sup>47</sup> Fires in Russia also cut wheat harvest by nearly 40 metric tons from 2010 to 2011<sup>48</sup>. With very little arable land and scarce water, the Middle East and North Africa imports more food per capita than any other region.<sup>49</sup> The region also relies heavily on Russian grains, so mounting drought from preceding years and the dramatic de-

cline in Russian grain supplies severely aggravated the Middle East's ability to feed its citizens. Citizens' inability to afford food directly contributed to riots in Syria, Algeria, and other regions.<sup>50</sup>

Conflict in the Middle East still rages in full force, and millions of individuals are fleeing the region for homes without volatile regimes and that are altogether safer and more stable. As more of these individuals leave, distribution of resources will shift and responsibility may be pushed onto the nations that host these refugees to effectively resettle them. However, not all nations are required to accept climate refugees; in fact, the 1951 United Nations "Convention and Protocol Relating to the Status of Refugees" does not technically include climate refugees as legitimate refugees because the doctrine was drafted at a time before climate change became a topic of debate.<sup>51</sup> However, in the 2016 Paris climate talks, many nations that are most affected by sea level rise and nations that have taken on a significant number of undocumented refugees had expressed interests in listing climate refugees as legitimate. For now, the status of these individuals is left to individual countries.

While the 1951 Convention on Refugees makes recommendations on handling the cases of refugees, there is no formal international police force to monitor these recommendations and guidelines. Lack of adequate control coupled with the United States' deep involvement in Middle East activity creates unique problems for American policymakers. As an economic leader, the United States pays nearly \$1.2 billion to the United Nations, effectively covering 22 percent of the organization's biannual budget.<sup>52</sup> For reference, Japan is the UN's second largest source of funding, providing just under 10 percent of the budget.<sup>53</sup> These numbers exclude other

UN operations like peacekeeping and agency funding; with these added costs, the US spends approximately \$3.3 billion per year to fund UN activities.<sup>54</sup> In short, the United Nations relies heavily on support from the United States. However, President Donald Trump and his administration have plans to cut UN spending by 40 percent.

Plans to realign the budget come at a time when the President has also announced plans to cut funding to the Environmental Protection Agency<sup>55</sup> while simultaneously expanding defense spending.<sup>56</sup> The President has repeatedly expressed concern toward the safety of the Middle East with his most recent actions being to impose a temporary ban on the immigration of individuals from predominately Muslim nations. Moreover, Trump has also shown that he is skeptical toward the effects of climate change, going as far to claim that he will cancel the Paris Agreement and that human-caused climate change is a hoax.<sup>57</sup> If the President refuses to acknowledge climate change as an issue, he is effectively ignoring the role that climate change has as a catalyst for conflict in the Middle East.

Defense Secretary General James Mattis has stated that climate change is already destabilizing parts of the world.<sup>58</sup> Mattis also noted that climate change impacts the stability of many of the areas that troops are stationed in and also notes that it is standard practice for the Combatant Commands to incorporate drivers of instability — such as climate change — into assessments of site stability before entering a new region.<sup>59</sup> In effect, unstable regions compromise the safety of the troops; if it is possible to control for the stability of a region, then leaders ought to consider those factors. Because scientists have shown that climate change is primarily human-caused, the United States ought

to take an active role in bettering the environment for civilian and troop safety.

In addition to troop safety in conflict-stricken areas, the United States military is also concerned with the safety implications that climate change may have on our homeland. In 2007, the Council on Foreign Relations, a non-partisan think tank, released a special report, "Climate Change and National Security: An Agenda for Action." The report addressed the implications that climate change has and may have in the future. It highlighted military officials' concerns toward the growing issue and offered insight as to how planetary changes would affect U.S. national security. To begin, climate change will directly impact the United States' ability to maintain its national security through the threat that rising sea levels pose to military bases across our nation. For example, the Homestead Air Force Base in Miami was so severely damaged by Hurricane Andrew in 1992 that it never reopened.<sup>60</sup> Additionally, a University of South Florida simulation found that the U.S. Southern Command, the center for strategic command for Latin America, is extremely vulnerable to severe storm damage with the changing climate.<sup>61</sup> If our nation's command centers are damaged or otherwise made incapable of operating at peak performance, the United States is placed in a vulnerable position and the country could be an easier target for political coercion or aggressive attacks.

Knowing that climate change will effectively undermine the emerging stability of developing nations, it is critical that the United States recognizes the reality of climate change and the implications it will have on trade, resource competition, and human migration. We cannot effectively address these issues without acknowledging the driving forces behind them. In an effort to

maintain the security of our borders, everyone must remain sensitive to the interests of our fellow nations; failure to cooperate will have grave consequences not only for everyone on Earth, but for all future generations hoping to call this planet home as well.

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